Northern Rockies Weather Watch

NWS Missoula, Montana

October, 2010

Winter Outlook for Northern Region

Unlike last winter, which was dominated by a strong El Niño, the oceanic waters along the equator have cooled significantly to below normal, representing a change to La Niña conditions. In La Niña years, the jet stream (swiftly moving winds in the upper atmosphere) usually shifts south over the northern tier of the United States. This generally leads to more weather systems moving through the northern Rockies in the winter months. Therefore, La Niña years typically result in normal or above normal snow pack in the mountains. Valley locations can also expect normal or above normal precipitation amounts, but due to variable temperatures, this precipitation could fall either as rain or as snow. This temperature variability makes it pretty difficult to determine how much snow will occur in the valley locations. In any case, skiers and snowboarders should be looking forward to a good snow year around the region!

Inside this issue:

Spotter Information Contacts

- Peter Felsch
- Trent Smith

Ph: 406-329-4840

Show Us Proof

Do you have a camera on your cell phone? Have you taken photos of a weather event or damage after an event? You can make a difference with those weather photos. Send them directly to the employees of the National Weather Service in Missoula, MT by simply texting or emailing your photos during or after an event to mso.media@noaa.gov. Your photos can help us issue warnings or verify our forecast. The following photos were sent to mso.media@noaa.gov.

- Don't forget to check out our blog and other weather information at: www.weather.gov/missoula

CoCoRaHS

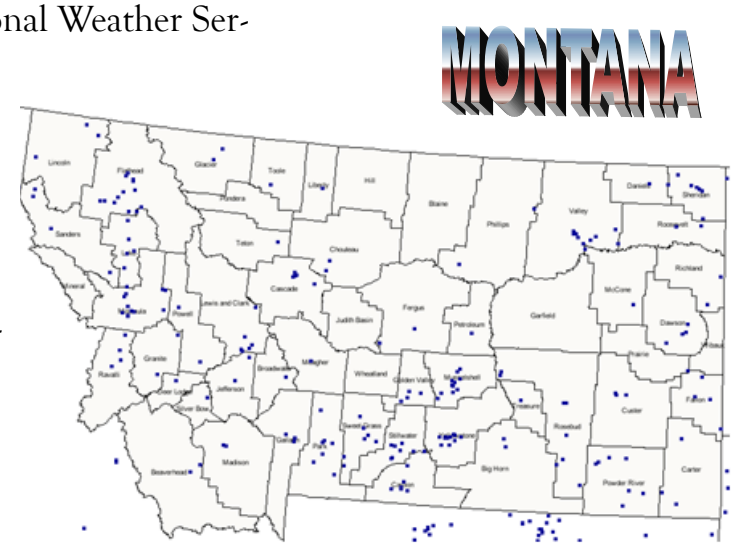
by Trent Smith

Community Collaborative Rain, Hail and Snow Network

Let me begin with a big THANK YOU to all our current CoCoRaHS observers across North Central Idaho and Western Montana. Your data continues to be vital to the National Weather Service and all institutions that have to rely on accurate precipitation totals.

For the spotters who are not CoCoRaHS observers, we need you. If you refer to the maps for Idaho and Montana on the CoCoRaHS website, you will see that we have large holes we need to fill because precipitation data is sparse in the Northern Rockies. The more spotters we have as CoCoRaHS observers the better. Observers must have access to the internet and a few minutes each day, especially during precipitation events, to take a daily precipitation reading and record the information on the CoCoRaHS website. To learn more or complete the training, go to www.cocorahs.org, or you may contact me for more information on this valuable program.

The National Weather Service in Missoula, MT has not been conducting in person CoCoRaHS trainings the past few years because the CoCoRaHS website provides excellent online training. Any questions regarding the training, the program, or individual precipitation readings can be answered by email or phone. I usually try to get to your emails as quickly as I can, but if I have not responded within a week, please send me another email or call me. Thank you!



Trent Smith
CoCoRaHS Focal Point
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A Severe Wind Gust Hits Salmon Idaho

by Trent Smith

On July 13, 2010 at 9:30 pm a wind gust in excess of 65 mph hit the community of Salmon, Idaho. This storm caused power outages, roof damage, downed trees and toppled chimneys across the town (fig. 1).

Figure 1

Radar returns indicated very weak shower and thunderstorm activity advancing on the community. However, typical radar signatures for strong winds in Lemhi County were not present. A couple of different weather elements came together over the community to create a significant wind gust. To start off a polar cold front was moving into eastern Montana causing the pressure gradient to tighten over Lemhi County and southwest Montana. The Salmon Raws (fig. 2) observations show the steady increase in winds during the afternoon and evening hours on July 13th. A disturbance moving across central Idaho helped kick off convection in the southern Clearwater mountains. The convection steadily weakened as it moved towards Salmon Idaho with the last lightning strike being an hour before the strong wind gust. Satellite water vapor imagery (fig. 3) shows that the disturbance intensifies as it moves over Lemhi County which helped mix additional mid level winds to the surface. The combination of pressure gradient winds, outflow winds from the convection and the additional mixing of mid level winds allowed for severe winds to mix through the Salmon valley in Idaho causing significant damage.

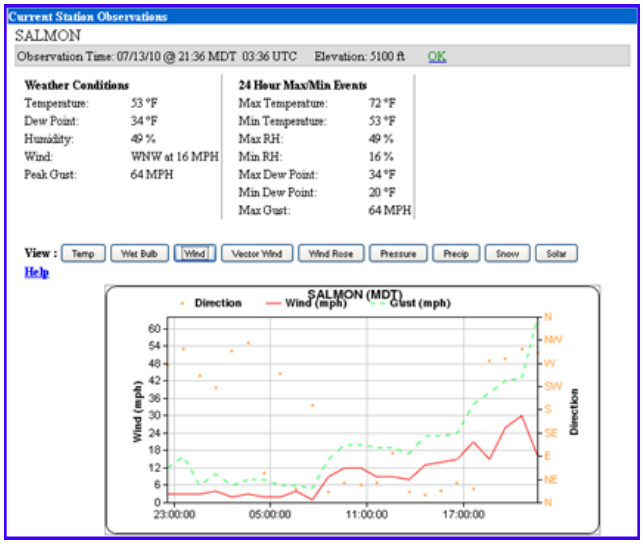


Figure 2

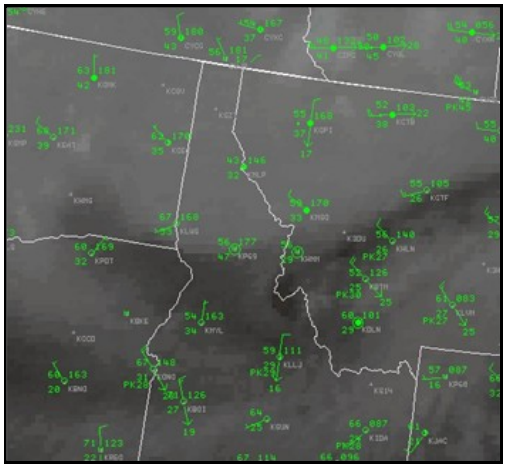


Figure 3

Flash Floods hit the towns of Hot Springs and Drummond, MT

By Ray Nickless & LeeAnn Allegretto

Hot Springs, MT – Flash Flood

On the morning of August 2nd, 2010 the weather forecast for Hot Springs, MT called for temperatures in the lower 80's with scattered showers and thunderstorms in the afternoon and evening. As the day progressed, at 3pm that afternoon, the high temperature reached 85 degrees fahrenheight. The forecast for thunderstorms came to fruition in the late afternoon as a thunderstorm began building just south of Hot Springs and slowly moved north. The storm began producing rain in Hot Springs at 6 pm that evening and continued to intensify which soon produced very heavy rain combined with penny to nickel sized hail. Over the next hour between 6pm and 7pm a Remote Automated Weather Station (RAWS) site in Hot Springs recorded 1 inch of rain in 1 hour. The rain continued as the thunderstorm became stationary over the Hot Springs area. Rain finally quit falling around 8pm that evening and the final 2 hour total from the RAWS site was 1.59 inches. In the meantime; rain was falling at a similar rate in the foothills to north of town which created runoff and overland flow in an area known as Rattlesnake Butte. This rain created raging rivers that moved down the hill rapidly and flooded portions of Hot Springs and Camas. *(Figure 1)*

Figure 1 – Video footage of flash flooding in Hot Springs, MT

A flood survey conducted the next morning of August 3rd by National Weather Service employees Ray Nickless (Service Hydrologist) and Bruce Bauck (Meteorologist in Charge) revealed flash flooding through the streets of Camas and Hot Springs. Some homes in Camas and Hot Springs had damaged driveways and land erosion on their property. Reports from the Sanders County Sheriff's office indicated many homeowners had water flow into their basements. The survey also revealed flooding debris that reach 4 to 5 feet in depth and piles of hail 1 to 2 feet deep. (*Figure 2*)

Figure 2 – Piles of hail and flood debris 1 to 2 feet deep.

Flash Floods hit the towns of Hot Springs and Drummond, MT

(continued)

Drummond, MT – Flash Flood

On the afternoon of August 5, 2010, a very moist and unstable atmosphere helped initiate a thunderstorm outbreak that occurred across southwest Montana. Many of the storms that developed produced hail and heavy rainfall. One such storm developed over the town of Drummond, Montana during the late afternoon hours, and resulted in flooding portions of the town. During the storm's initial stage, it gained energy to the south of Drummond as it tracked northward. The storm then gained further momentum and grew significantly in size, passing directly over Drummond as it reached maturity.

Figure 1 – Flooding of area home

RADAR precipitation estimates during this time were around 1.00-1.35 inches of rain per hour with this storm, with the focus of these amounts over Edwards's Gulch, an area of grassy, non-forested hills located directly northeast of Drummond.

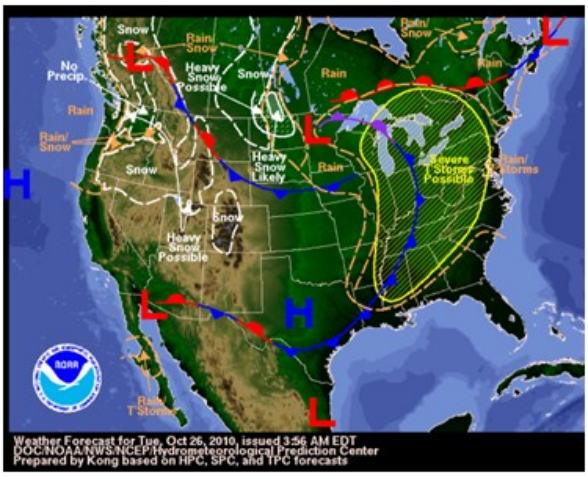
Heavy rain concentrated runoff into Edwards's Gulch, which produced a raging river of muddy water that flowed under I-90, through a huge culvert, and into the streets of Drummond. The result was washed out roads, debris flows and flooding of homes and businesses *(Figure 1 and Figure 2).*

Figure 2 – Debris line indicating level of flood water near home

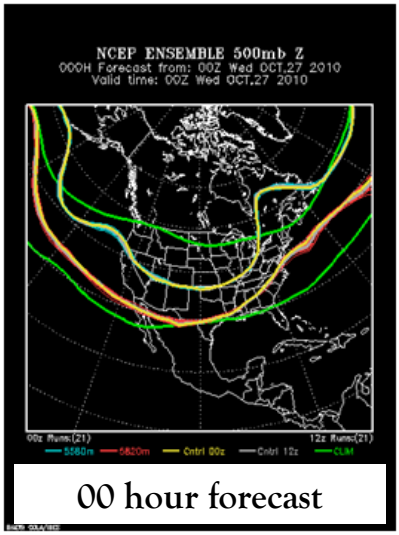
Hydrometeorological Prediction Center

THE PLACE METEOROLOGISTS TURN FOR A FEW ANSWERS

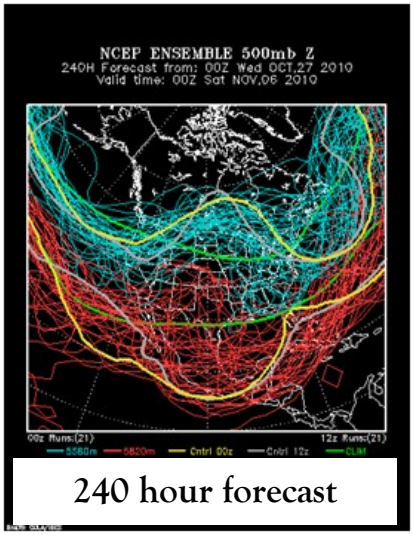
Forecasters rely on several models to produce a weather forecast including Global Forecast System (GFS), North American Meso Model (NAM), European Center for Medium Range Weather Forecasts (ECMWF), United Kingdom Meteorogical (UKMET) and Canadian. Each model has slight variations in programming and observations which produces different model solutions called ensembles. A National Weather Service forecaster has several dozen different model solutions to look at and must decide which model appears to be correct. When we have questions regarding which model guidance to follow, we turn to the Hydrometeorological Prediction Center (HPC), whose mission is as follows: "HPC delivers weather forecast guidance products and services in support of the daily activities of the National Weather Service and its users." The HPC issues several products to help forecasters figure out which model to use to provide the best forecast for the general public and all of our partners.



The numerical model diagnostics and interpretation products are probably the most used within a NWS forecast office. These products give forecasters a subjective interpretation how these models compare to the current state of the atmosphere and with each other. One of the biggest products that HPC and local forecast offices look at are spaghetti plots (images below). These plots allow forecasters to quickly analyze what weather pattern is being advertised by all the models. The individual light blue and red are each run of the GFS ensemble run. While the thick yellow lines indicate the mean or average of the ensemble runs. The diagnostic and interpretation products give forecasters a quick place to turn to figure out which model to follow.



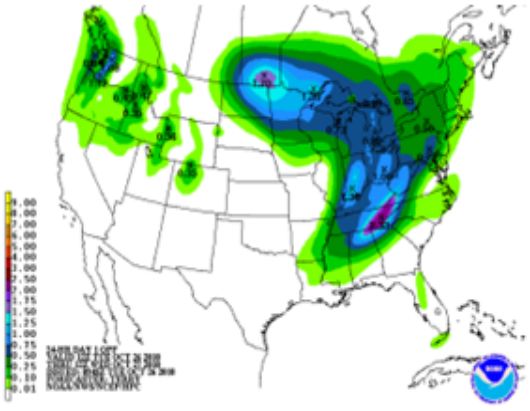
00 hour forecast



240 hour forecast

HPC also generates a Quantitative Precipitation Forecast (QPF). This part of HPC develops graphics on accumulating precipitation, heavy rain, heavy snow and areas of potential flash flooding. The heavy snowfall graphics assist local forecast offices coordinate with one another.

HPC is also the back-up center for the National Hurricane Center (NHC). If NHC has to be closed, HPC would be responsible for issuing all tropical cyclone products including watches, warnings and discussions for all hurricanes that occur within the Atlantic Ocean and eastern Pacific Ocean.



New Hailstone Record!

A new hailstone record has been set! On July 23rd, 2010 severe thunderstorms began to develop over portions of central South Dakota. One of these storms intensified quickly and dropped hail up to the size of volleyballs over Vivian, South Dakota! The largest hailstone observed was eight inches in diameter, nearly 19 inches in circumference, and weighed an astounding 1.9 lbs. This broke the previous hailstone record for both diameter and weight. The previous record holder for largest diameter hailstone fell in Aurora, Kansas on June 23rd, 2003. This stone was seven inches in diameter!

The Vivian, South Dakota hailstone, measuring in at eight inches in diameter and weighing an astounding 1.9 pounds!

The previous record holder for heaviest hailstone fell in Coffeyville, Kansas on September 3rd, 1970, weighing in at 1.7 lbs. The Vivian, South Dakota hailstone's official dimensions were measured some time after the event. Therefore, it could have been quite a bit larger at the time of impact due to melting and sublimation. Although this was the largest hailstone out of the storm, many hailstones up to six inches in diameter were reported. The storm also contained winds up to 80 mph and a brief tornado.

The divot left in the ground from hailstone impact was nearly eleven inches across!

Staff Spotlight

Name: **LeeAnn Allegretto**

Position: **Journeyman Forecaster**

Hometown: **Weedville, Pennsylvania (Northwest PA)**

National Weather Service Background:

LeeAnn attended the Pennsylvania State University from 2002-2006, and was able to begin her career with the National Weather Service a year before she graduated. During the summer of 2005, she received an internship at the National Weather Service Alaska Regional Headquarters in Anchorage, where she gained her first real experience working in the field of meteorology. She graduated with a Bachelor Degree in Meteorology in May of 2006, and became an intern for the National Weather Service forecast office in Caribou, Maine later that year. After only a brief time working there, she was promoted to a journeyman forecaster for the National Weather Service forecast office in Missoula, Montana in May of 2008. Since then, she has found forecasting in three very different geographical locations her biggest challenge, but also her biggest thrill.

Why did you want to become a meteorologist?

Growing up in rural northwest Pennsylvania, I remember winters being long, snowy, and often icy. Major ice storms and snow storms were normal, and like any kid on a snow day, I grew to love big winter storms. That childhood love matured into a fascination with winter weather forecasting, and has led me on the path my career has taken. To this day, I still get excited when 12 inches of snow is in the forecast, and even more excited when I'm the one who gets to forecast it!

What are a few of your other responsibilities in the office?

One of my other interests happens to be anything involving bodies of water, so I have dedicated a great deal of my time to the hydrology program, functioning as the Hydrology Focal Point in our office. My responsibilities include overseeing our office hydrologic products, traveling around our forecast area to monitor and repair river gauges, as well as helping to develop better river forecasting guidance with our Service Hydrologist for the rest of our staff. I've also had a hand in developing a better Flathead Lake wave and wind forecast by doing outreach with our lake users.

What do you like to do for fun outside of work?

I absolutely love being outdoors, and I've always enjoyed being in the mountains, so it goes without saying that I do a fair amount of backpacking and mountain climbing in my free time. I've had the pleasure of summiting several mountain peaks from Alaska, to the East Coast, and throughout the West as well. Mountaineering is also something I've become more involved with, and my future plans include summiting Mount Rainier before my time in the West is complete.

End of the Drought!

Due to the unusually cool and wet late spring and summer in the northern Rockies, we have finally been cleared of drought status! El Niño conditions, which brought less than normal snowpack last winter (sorry skiers!) and worsened our drought concerns, began to weaken and eventually dissipate over the summer months. A more active weather pattern returned to the Northern Rockies, bringing an abnormally wet and cool spring and summer. June proved to be significantly wetter than normal in most locations of western Montana and north central Idaho. In fact, precipitation amounts were 2" above normal for June this year in Missoula, Butte, and Kalispell, as well as many other locations in the region. Summer made a brief appearance by the second week of July, however temperatures continued to remain near normal for the summer months. August ended the summer with a mixed bag of warm sunny days and cool rainy days. Precipitation remained near normal however, further building the increase of moisture in the region and reducing drought concerns!

For more information on drought in the U.S. see:

http://www.drought.unl.edu/dm/

U.S. Drought Monitor
West

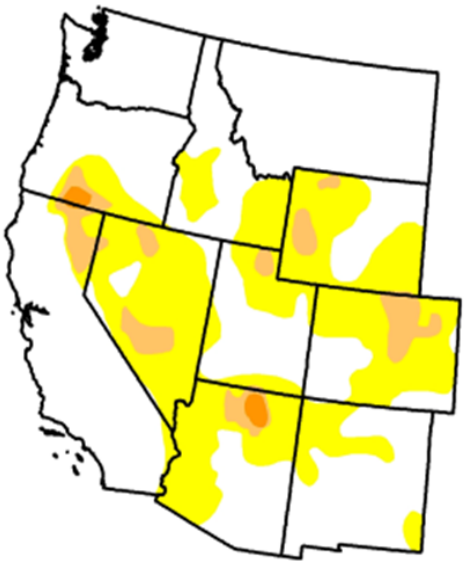
October 12, 2010
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	62.5	37.5	5.5	0.6	0.0	0.0
Last Week (10/05/2010 map)	62.5	37.5	8.4	0.6	0.0	0.0
3 Months Ago (07/20/2010 map)	69.0	31.0	9.6	0.6	0.0	0.0
Start of Calendar Year (01/05/2010 map)	40.1	59.9	30.6	9.9	0.5	0.0
Start of Water Year (10/05/2010 map)	62.5	37.5	8.4	0.6	0.0	0.0
One Year Ago (10/13/2009 map)	41.8	58.2	26.5	13.1	0.0	0.0

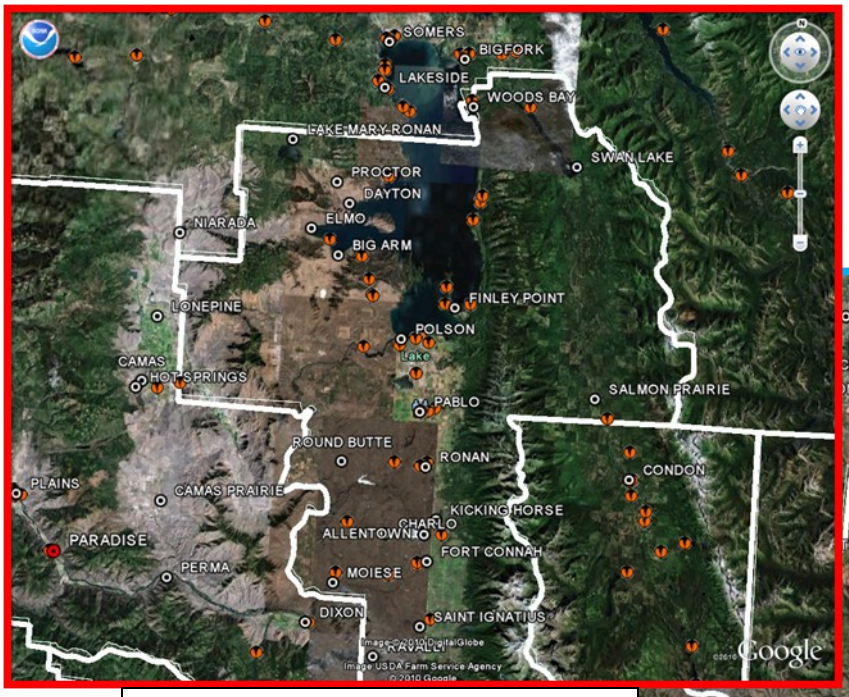
Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

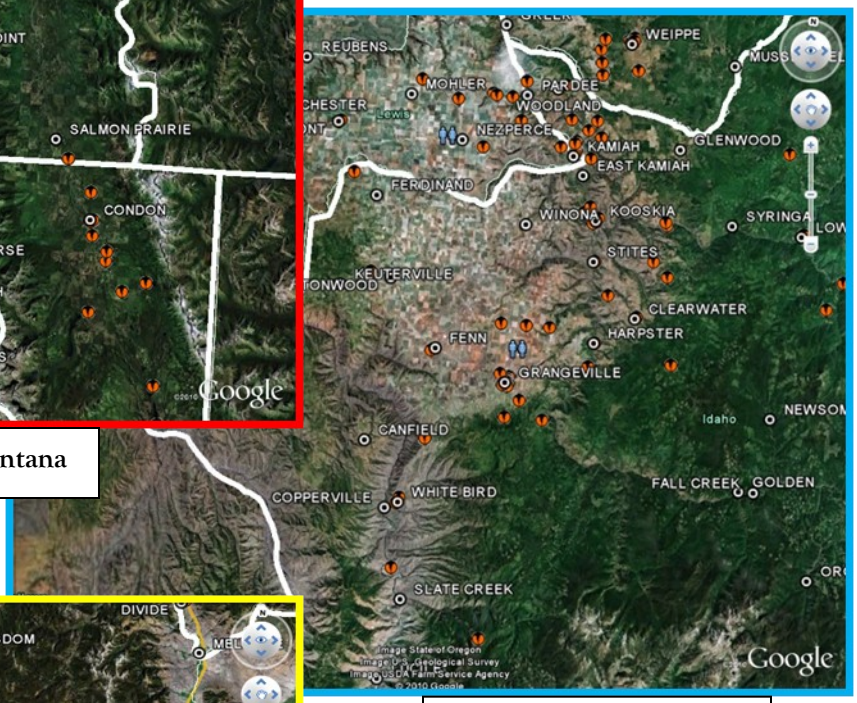


FILL IN THE HOLES

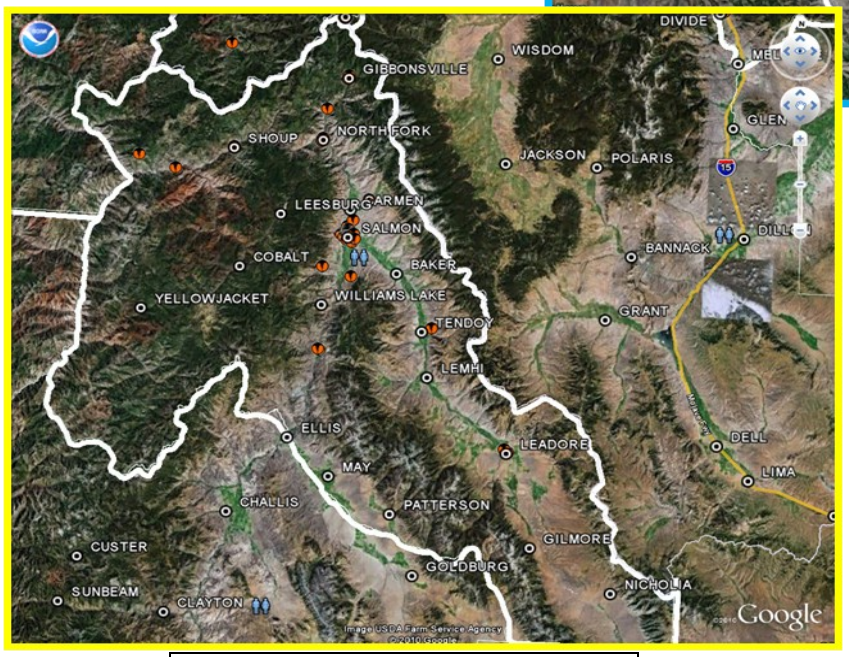
We need your help! If you have friends that live within a vacant spot you see in the following forecast areas, please let them know about the spotter program. They can contact Peter Felsch or Trent Smith at 406-329-4715.



Mission Valley and HWY 83, Montana



Camas Prairie, Idaho



Lemhi County, Idaho